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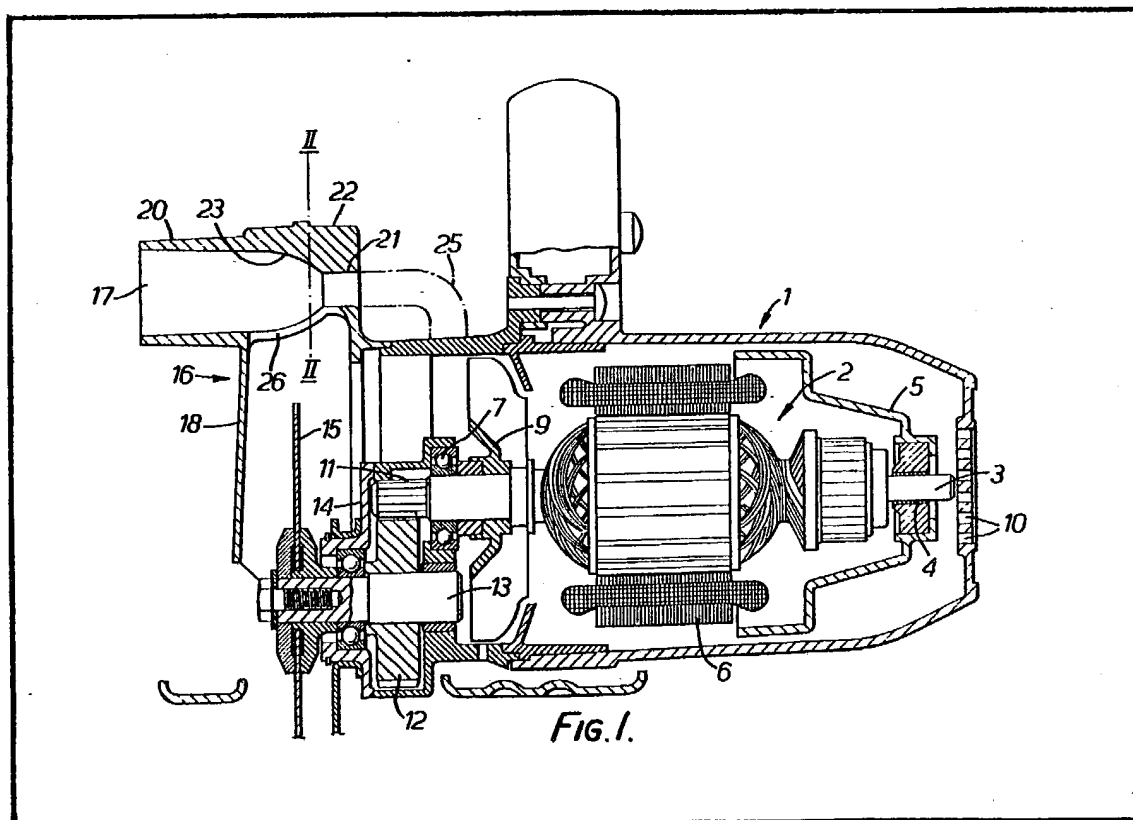
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(54) Power tools

(57) A circular saw or cutting disc has an upper guard 16 having an exit passage 17. Rotation of a cutting blade 15 creates an air flow within the guard which tends to entrain debris from a cutting operation and carrying it toward the exit passage. Aligned with the passage 17, the guard has an inlet passage 21 supplied with air from a fan 9 on the shaft 3 of the motor that drives the saw. A tube 27 conveys air from the fan 9 to the passage 21.



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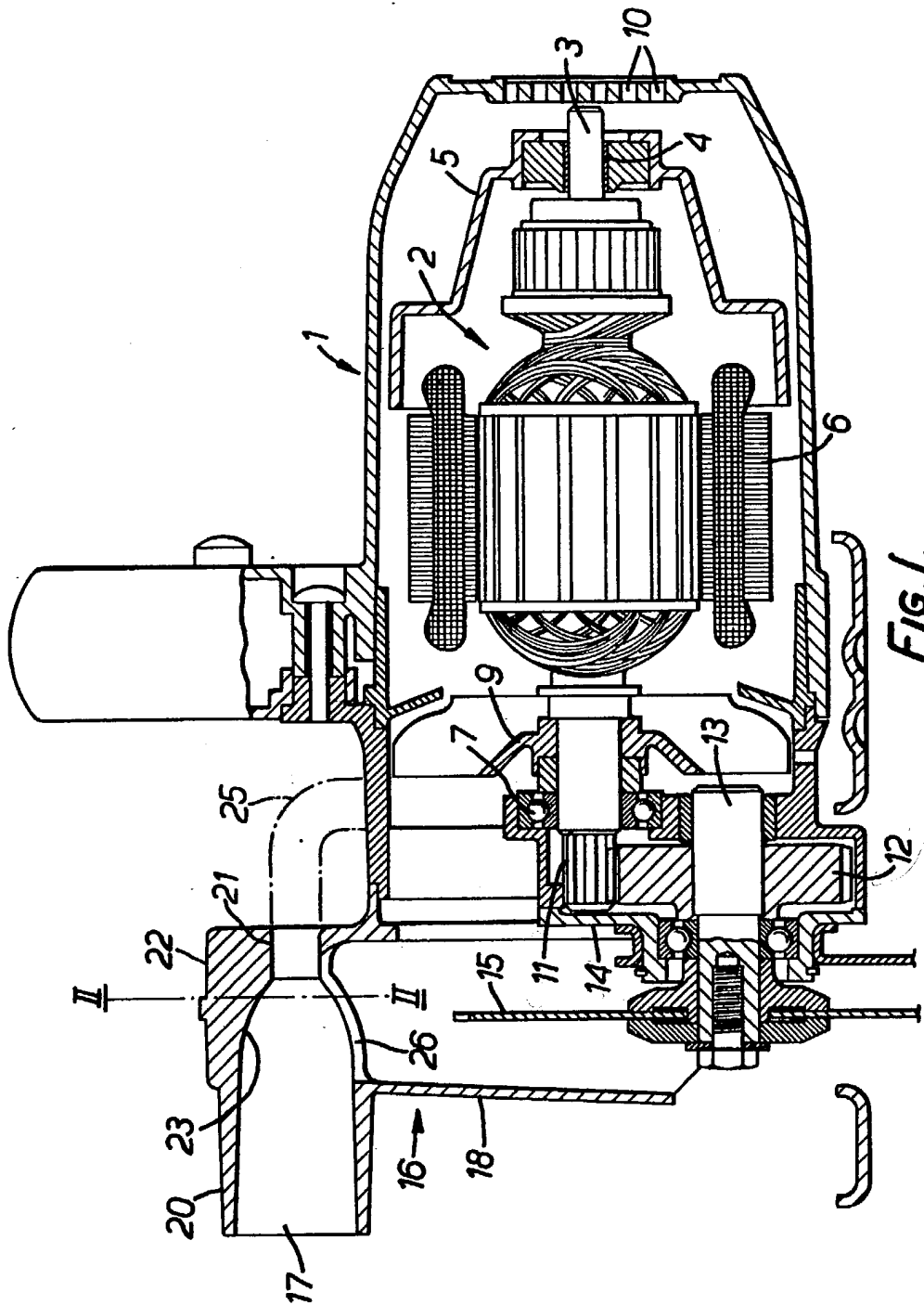


FIG. 1.

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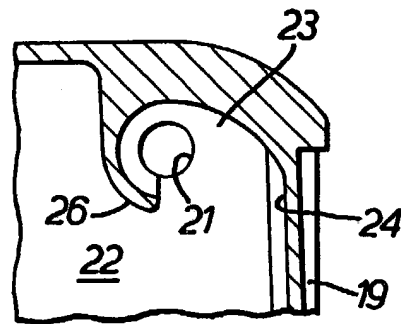


FIG. 2.

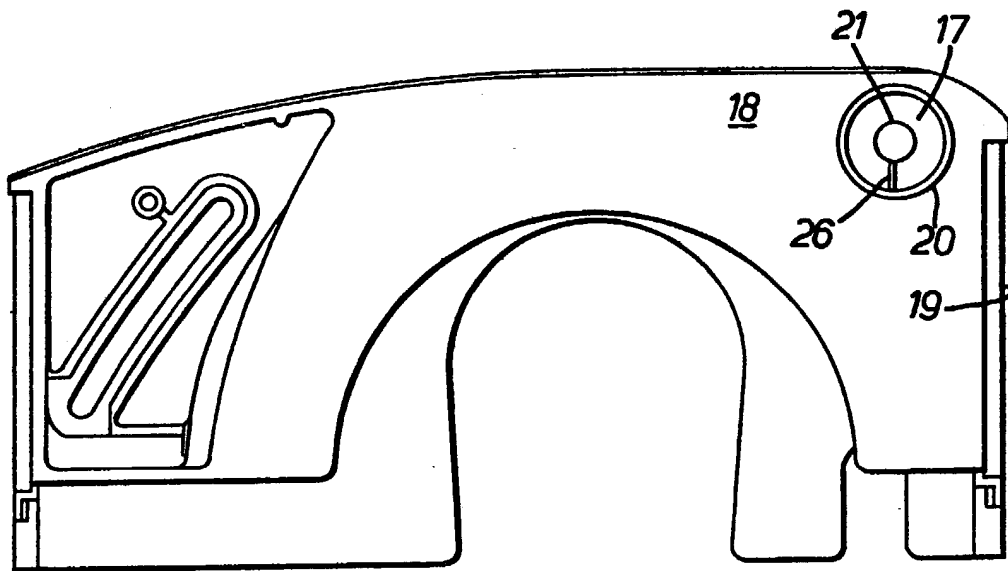


FIG. 3.

## SPECIFICATION

## Improvements in or relating to power tools

This invention relates to power tools and more especially to hand-held and bench mounted power tools, for example powered circular saws and cutting discs.

One of the problems with powered, circular saws and cutting discs is the effective and safe removal of debris from the vicinity of a cut when the tool is in use. When cutting wood, the debris comprises saw dust and sometimes small wood chippings. Some tools are fitted with a debris collecting bag or a duct for withdrawing debris from the vicinity of the cut. In many cases, the bag and duct are connected via a separator, for example, a cyclone separator to a system for creating a flow of air through the bag or duct to assist withdrawal of debris. In other forms, an upper guard has an orifice in its upper part through which some at least of the debris created during cutting is carried by the stream of air created by rotation of the saw blade or cutting disc. However, the existence of the aperture creates a hazard since it gives access to the saw blade or disc and, therefore, a guard must be provided to make it difficult for a user inserting a finger or some other article through the aperture. The guard impedes free movement of debris through the aperture and reduces the effectiveness of the latter as an exit for debris.

According to the present invention, a powered circular saw or cutting disc includes a guard for at least the upper part of the saw blade or disc, a discharge aperture located in the upper part of the guard for debris created during a cutting operation, a housing containing a motor for driving the blade or disc, a fan for providing a flow of air, and a duct for directing into the aperture part at least of the air flow created by the fan.

Preferably, the duct terminates adjacent to the aperture and is so arranged to direct a flow of air through and across the upper part of the aperture.

In one embodiment of the invention, the guard is so contoured internally in the vicinity of the aperture that debris entrained in the air flow created by rotation of the saw or disc is directed towards the aperture.

The contouring may be of volute form designed to direct air flow into the aperture.

The guard may be formed or provided with a passage to which the duct is joined and which is so orientated that air leaving the passage is directed towards the centre of the aperture.

By way of example only, a hand-held, powered circular saw will now be described in more detail with reference to the accompanying drawings of which:

Fig. 1 is a vertical section through the saw but showing only those parts thereof necessary for an understanding of the invention,

Fig. 2 is a section through a part only of the saw on a plane at right angles to that containing Fig. 1, and

Fig. 3 is a side view of part of the saw.

The saw has a main body member 1 housing an electric motor 2 whose rotor shaft 3 is supported at one end in a plain bearing 4 carried by an end cap 5 secured in a manner not shown to the laminated field core 6 of the motor. The other end of the rotor shaft 3 is rotatably supported in a ball bearing 7.

Mounted upon the shaft 3 for rotation therewith is a radial flow fan 9 which, on rotation of the shaft, draws air in through openings 10 at one end of the housing 1. The incoming air flows over the motor 2 so cooling it.

That end of the shaft 2 adjacent the bearing 7 is in the form of a pinion 11 in mesh with a gear wheel 12 secured to a shaft 13 rotatably mounted in the walls of a gear box 14 enclosing the pinion 11, gear wheel 12 and shaft 13. Also secured to the shaft 13 at that end projecting from the gear box is a circular saw blade 15.

The upper part of the blade 15 is located within an upper guard 16 fixed to the gearbox 14. A movable guard protects the lower part of the blade 15 but this guard is not shown in the drawing.

The upper guard has an exit passage 17 in its front wall 18 in the vicinity of the upper part of the side wall 19 of the guard. The aperture 17 is defined by a hollow boss 20 that extends from the front wall 18. Concentrically with the aperture 17 is an inlet passage 21 formed in the rear wall 22 of the upper guard.

In the vicinity of the passages 17 and 21, the upper guard is contoured internally to produce a volute formation 23 which merges both with the internal surface 24 of the side wall 19 and with the internal surface 25 of the rear wall 22 to form an internal wall 26.

The internal wall 26 also acts as a safety wall that, in conjunction with the boss 20, prevents contact with the blade 15 of a user's finger if inserted into the passage 17.

Inserted into the passage 21 is a tube 27 indicated in dotted lines which represents a connection from the passage 21 to an aperture 28 in the housing 1. Although shown as positioned wholly externally of the housing 1 and guard 16, the tube 27 may be an integral part of the housing and may be located, at least in part, within the housing 1.

Although not shown in the drawing, it will be understood that the saw incorporates other components included in conventional hand-held, powered, circular saws including means for adjusting the depth to cut and the inclination of the saw blade 15.

In use, rotation of the blade 15 creates an air flow within the guard 16 which tends to entrain debris such as saw dust and wood chippings created during sawing and carry the debris upwardly towards the upper end of the guard where it is helped by the volute surface 23 and the wall 26 to exit through the passage 17.

At the same time part of the air flow through the housing 1 is conveyed by the tube 27 and passage 21 to the passage 17 and this air flow

assists the discharge of debris through the passage 17.

As can be seen from the drawing, the passage 17 and the volute surface 23 are closed to the teeth of the blade 15 and this produces an air flow over the teeth which helps to remove any debris on the latter.

In addition, air exiting from the passage 17 assists the movement of air created by rotation of the blade 15, the effect being somewhat similar to that of an ejector nozzle.

That effect may be enhanced by suitably designing the exit end of the passage 21.

Additionally, a greater flow of air may be induced by designing the passage 21 as an ejector nozzle able to draw in air via openings in the guard 16 adjacent the ejector.

It will be understood that, if desired, a second fan may be mounted upon the shaft 3 to provide a flow of air exclusively for the tube 27.

The invention may also be incorporated into bench fitted circular saws and cutting discs.

#### Claims

1. A powered circular saw or cutting disc having a guard for the saw or disc, the guard having an outlet passage in its wall for the discharge of debris carried into the guard during a cutting operation, a housing containing a motor for driving the blade or disc, a fan for providing a flow of air, and a duct for directing into the outer passage part at least of the air flow for assisting

the discharge of debris through the aperture.

2. A circular saw or cutting disc as claimed in claim 1 in which the internal surface of the guard in the vicinity of the outlet passage is so contoured as to promote the discharge of debris through the aperture.

3. A circular saw or cutting disc as claimed in claim 2 in which the contour of the internal surface is of involute configuration.

4. A circular saw or cutting disc as claimed in claim 3 in which the guard has an internal wall part of whose surface provided a portion of the involute configuration.

5. A circular saw or cutting disc as claimed in any one of the preceding claims in which the outlet passage is defined by a boss that projects externally from the guard.

6. A circular saw or cutting disc as claimed in any one of the preceding claims in which the guard has an inlet passage aligned with the outlet passage to which the duct is connected.

7. A circular saw or cutting disc as claimed in any one of the preceding claims in which the fan also provides a flow of cooling air for the cooling air for the motor.

8. A circular saw or cutting disc as claimed in any one of claims 1—6 in which a flow of cooling air for the motor is provided by another fan.

9. A hand-held powered circular saw substantially as herein described with reference to and as illustrated by the accompanying drawings.